Systematic Reviews: A Complex Search Episode for Evidence Based Policy and Practice

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A long term smoker with chronic obstructive airways disease (COPD) who has recently quit smoking has breathing difficulties. What are the suitable non-drug therapies to improve the patient's breathing?

(example by Prof. Paul Glasziou)

Is adjunctive vitamin A effective in children diagnosed with non-measles pneumonia?
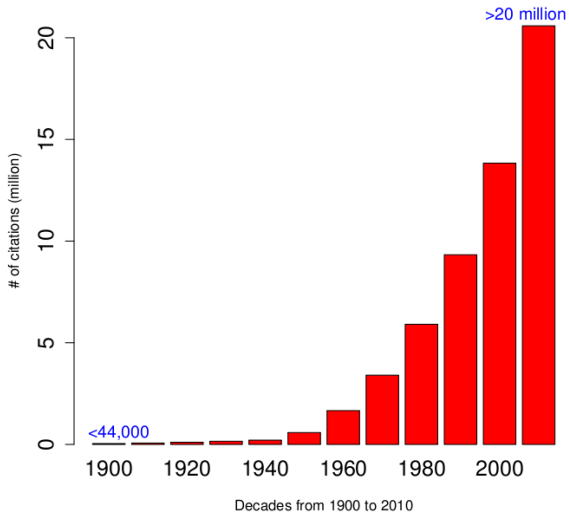
(Cochrane collaboration)

A clinician applying research to practice needs to know:
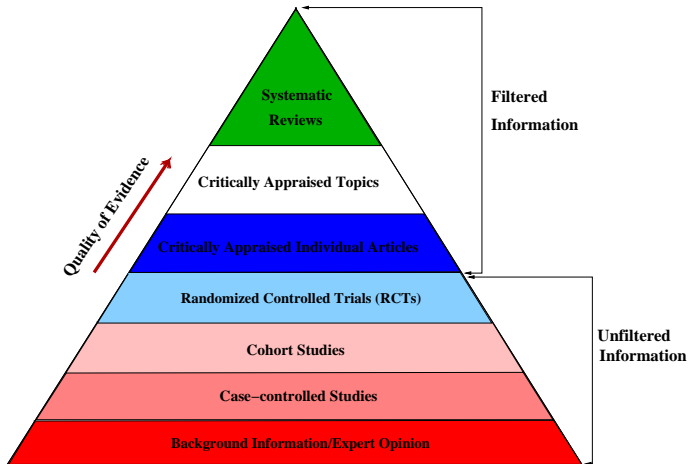
What? interventions match the patient's conditions

What? quality of evidence and applicability

What? duration, dosage, ...

Growth of medical scientific literature archive (MEDLINE)

Evidence-Based Medicine (EBM)

EBM applies the best available evidence to clinical decision-making.

A sample systematic review

Title: Vitamin A for non-measles pneumonia in children

Main question: Is adjunctive vitamin A effective in children diagnosed with non-measles pneumonia?

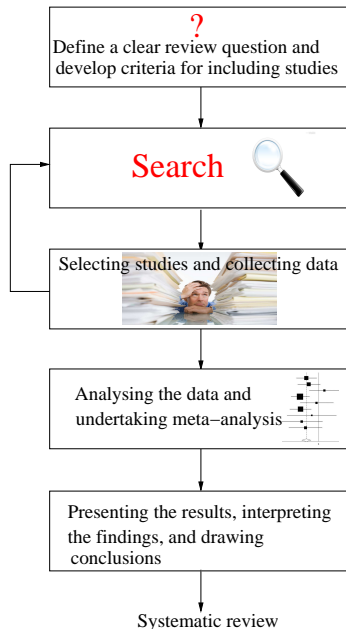Inclusion criteria: Only parallel-arm, randomized controlled trials (RCTs) and quasi-RCTs, in which children (younger than 15 years of age) with non-measles pneumonia were treated with adjunctive vitamin A, were included...

Methods: We searched The Cochrane Library, Cochrane Central Register of Controlled Trials (CENTRAL 2010, issue 3) which contains the Acute Respiratory Infections Group's Specialised ...

Main results: Six trials involving 1740 children were included. There was no significant reduction in mortality...

Systematic reviewing process

A sample MEDLINE query

1. exp vitamin A/
2. vitamin A.mp
3. retinol.mp
4. exp dietary supplements/
5. or/1-4
6. exp pneumonia/
7. pneumonia$.mp
8. exp pneumonia, bacterial/
9. exp pneumonia, lipid/
10. exp pneumonia, mycoplasma/
...
14. exp pneumonia, viral/
15. exp respiratory tract infections/
16. acute adj respiratory.mp
17. respiratory adj infection.mp
18. respiratory adj disease.mp
19. or/6-18
20. 5 and 19

A sample MEDLINE query

1.   exp vitamin A/
2.   vitamin A.mp
3.   retinol.mp
4.   exp dietary supplements/
5.   or/1-4
6.   exp pneumonia/
7.   pneumonia$.mp
8.   exp pneumonia, bacterial/
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10. exp pneumonia, mycoplasma/
...
14. exp pneumonia, viral/
15. exp respiratory tract infections/
16. acute adj respiratory.mp
17. respiratory adj infection.mp
18. respiratory adj disease.mp
19. or/6-18
20. 5 and 19

Scale of evidence inclusion
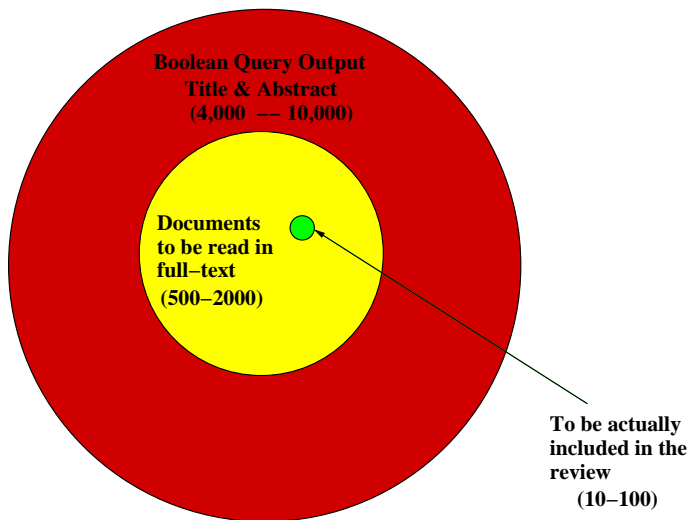
Where can we help?

Our contributions on introducing ranked retrieval is published in:
* S. Karimi, S. Pohl, F. Scholer, L. Cavedon, J. Zobel, Boolean versus Ranked Querying for Biomedical Systematic Reviews, BMC Medical Informatics and Decision Making, Vol 10, Number 58, 2010
* D. Martinez, S. Karimi, L. Cavedon, T. Baldwin, Facilitating Biomedical Systematic Reviews Using Ranked Text Retrieval and Classification, ADCS 2008, December 2008

To assist in query formulation for an initial search strategy

- Suggesting key-terms and synonyms e.g neoplasm for cancer
- Bag-of-words to Boolean Suggesting structure to specified query terms. Template queries already exist for limited inclusion criteria.

Consistency verification

- Automatic verification against inclusion criteria

- Automatic self-consistency verification: If a reviewer selects one document, but later chooses to ignore a similar one, the system should flag this possible inconsistency.

Dynamic relevance feedback

- Document selection process is currently paper-based.
- A dynamic relevance feedback approach that is active during the document selection process could rank the remaining documents based on estimated importance.
- Dynamic relevance feedback might identify additional documents that exist in the collection but were missed by the initial search strategy.

Analysis and Meta-Analysis

There are tools that assist analysing already extracted numerical data from one or multiple studies, but the input to these tools should first be extracted manually from text. Automatic information extraction can save hours.
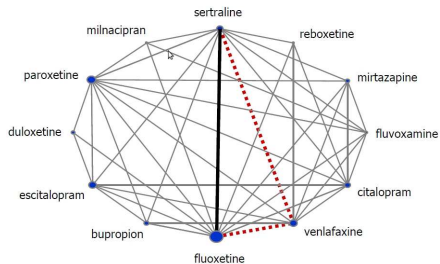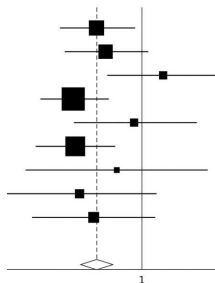
Review Update

Updating the review with new evidence so that it remains relevant.

Treatment X works.
Year 2005

Treatment Y is preferred over X.
Year 2010

Literature survey is hard!

Thanks!